Improving public health in Africa

Cervical cancer is the largest cancer threat to women’s health in Africa with mortality rising every year.

Much of this problem stems from poor awareness, scarce access to timely screening and vaccination, and lack of strategic public health infrastructure.

In developed countries such as USA or Europe, cervical cancer has a low mortality rate due to new advances in screening and immunization. These new advances mean that more can be done with fewer resources in Africa as well.

IBM has embarked on a journey to help monitor, treat, and prevent cervical cancer in Africa. Our goal is improve monitoring and decision-making through an integrated solution addressing both policy makers and care givers. The idea is to help promote a proactive approach to public health.

Scientists at IBM Research – Haifa have developed a prototype decision support tool that blends cloud and mobile technologies with advanced analytics to gather, manage, analyze, and visualize data on cervical cancer in Kenya.

The system includes four parts, integrated to provide a holistic approach to monitoring and decision support.

- A centralized registry manages the data.
- An analytics layer uses state-of-the-art machine learning to analyze the data and simulate ‘what if’ scenarios.
- A dedicated decision support web application visualizes the data and the outcome of ‘what-if’ scenarios for policy makers.
- A mobile application is used by care givers in the field to monitor and gather additional information.

‘What-if’ scenario analysis

IBM scientists constructed a Dynamic Bayesian Network and use state-of-the-art machine learning algorithms to infer the correct association between Kenya demographic variables with the progression of cervical cancer and possible treatment options.

The model is then used to simulate complex ‘what-if’ scenarios to determine the best outcome of where to invest efforts and resources.

Big Data goes mobile

As part of this solution, a mobile application helps direct community and healthcare workers in the field during screenings and vaccination campaigns. This application also allows the IBM system to further collect data about screened, vaccinated, and sick women into the registry.

- A decision support tool that allows improved care through disruptive technologies
- Governments can reach out to patients instead of waiting for them to come to the clinic
- Key technologies include machine learning to infer the complex associations between demographic factors, disease progression, and treatment options

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